

Performance Measures

Section L

Background

The Stevenson-Wydler Technology Innovation Act of 1980 and the Bayh-Dole Act, also passed in 1980, authorized and encouraged federal laboratories to transfer federally funded technology to industry and other nonfederal entities. Amendments to the Stevenson-Wydler Act, passed in 1986, 1989 and 2000, provided further encouragement for federal laboratories to collaborate with the private sector. The Technology Improvements Act of 1995, signed into law in 1996, shows additional bipartisan Congressional support and encouragement for federal laboratories to collaborate with the private sector for the purpose of technology transfer. Whenever a major national objective such as technology transfer is established, the need arises for measuring progress toward that objective. Congress must monitor performance for budgetary and political reasons. The private sector must monitor performance to determine areas of opportunity that best match their specific needs. The federal laboratories must also determine what programs are the most effective and what are the internal benefits of technology transfer.

There have been various attempts to determine how best to measure technology transfer. The US Office of Management and Budget, as well as many of the federal agencies, have identified several categories to indicate the level of technology transfer efforts such as the number of Cooperative Research and Development Agreements (CRADAs), invention disclosures, patents, license agreements, and royalty income. These however, are activity measures and indicate the type of technology transfer programs and, to a certain extent, the level of formal technology transfer effort. In themselves, they do not represent the quality or the impact of the transfer activity or the result. The kinds of impact information, such as new companies formed, new jobs created, jobs retained, or

market share increase, takes years from the time of the actual transfer to when the results become apparent. Although the economic impact of federal technology transfer programs is critical, the delay in obtaining this information is not acceptable for the policy makers and those implementing the programs within the federal laboratories in order for stakeholders to provide support for their continuing investment. Congress wants performance measurement information that not only is timely but, also which provides



them information on the effectiveness of the various technology transfer programs' contribution to the economic and social well-being of the United States. The federal agencies and laboratories also need this informa-

tion to determine which programs give them the most leverage based on their current investment while providing mission support.

Thus, it is important to identify what measures or indicators have an historical relationship to the nation's economic and social well-being. What these indicators look like will be dependent on various economic factors such as the specific technology transfer mechanism employed or the primary mission of the federal agency. For example, the percentage of invention disclosures that result in patents which in turn result in license agreements followed by a royalty stream indicate a number of factors. These factors include what proportion of invention disclosures and patents result in income producing licenses, the average return on license agreements per the type and degree of license exclusivity, and what proportion of the laboratory's research and development budget results in invention disclosures and patents.

An inherent weakness in collecting this type of data is that one relies on formal technology transfer mechanisms such as licenses and CRADAs. The less formal types of transfer, such as exchange of information among scientific colleagues or technical assistance, probably account for the majority of technology transfer, but is significantly more difficult to capture. For the purpose of this discussion, measuring the effectiveness of federal technology transfer is limited to the formal approach with the addition of anecdotal information to support numeric data.

Even when one focuses on measuring the effectiveness of formal technology transfer mechanisms or programs, it is difficult to determine what data is most meaningful and reasonable to collect. How do we measure the process of technology transfer without distorting or impeding it? Is there a culture change taking place? What objectives will provide both standards and incentives for technology transfer? These are examples of key questions that must be addressed when determining the effectiveness of any technology transfer mechanism program.

Seeking to promote improved government performance and accountability, Congress enacted the Government Performance and Results Act of 1993, which is referred to as GPRA. The primary goal of GPRA is to provide for the establishment of strategic planning and performance measures in the federal government. The types of measures under GPRA include:

Inputs-the resources and the raw materials required for a program or activity (e.g., people, funds and equipment);

Outputs-the immediate, observable products of the program or activity (e.g., number of patents, CRADAs and program dollars spent);

Outcomes-the longer term results to which the program achieves the intended ultimate effects or otherwise satisfies the stated objective or intended purpose (e.g., percent of patents licensed, marketing success rate based on number of contacts or dollars spent); and

Impacts-the total consequences of the program,

including both the intended benefits and unintended results, but not solely a result of any individual programs, outputs or outcomes (e.g., improved economic growth in local industry or reduced acquisition costs for a weapon system).

Data Elements

At the command level, we measure both the macro input and output aspects of transfer within the command's span of control, and outcome measures are more the type of anecdotal examples of the results of particular transfer activities. Specifically, we seek brief descriptions of technology transfers that resulted in notable benefit for the lab or where a product or process derived from a technology transfer project and/or license was introduced into the marketplace. This is in keeping with a Congressional hearing regarding the Biennial Report. On May 23, 2000, the House Science Committee expressed a strong desire that the federal labs make a greater effort to collect information that would be more indicative of the "outcomes" from technology transfer activities.

Existing data collected from the lab directorates and the centers for the Air Force quality performance indicator is used as a formal measure of transfer measurement. We use a "business performance indicator" to capture the value of what the Air Force received from the outside partner as shown in *Figure L1* below.

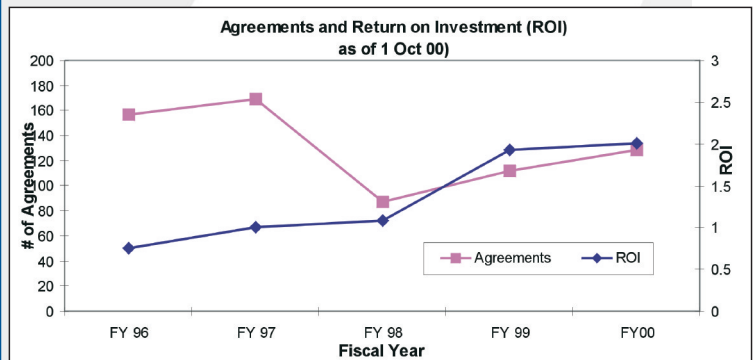


Figure L1

The left Y-axis represents the number of transfer agreements signed in each year and is measured by the curve with small squares (upper curve). The right Y-axis represents the amount of

return on investment as the ratio of both the Air Force and outside partner and is measured by the curve with the small diamonds (lower curve).

Return value paid by the outside partner includes royalties, reimbursements, and receipt of in-kind contributions. The amount of cash and in-kind services provided to the Air Force is an indicator of the value of the Air Force technologies transferred to the outside partner. The greater the value of the Air Force technology, the greater the partner is willing to provide the Air Force to receive that technology. The value of the Air Force investment includes transfer overhead plus the cost of supporting each transfer agreement. Refer to “Investment Level” on page L7.

In addition to the data that is required to be reported monthly to the Defense Technology Transfer Information System (DTTIS), the focal points for each laboratory directorate and center are encouraged to use additional performance measures to enhance their local management of the technology transfer process. The type of monthly data that is reported to DTTIS includes:

Local Control Number
 Location (Government Symbol)
 Fiscal Year
 Title
 Technology Transfer Mechanism
 Special Program Authority
 Distribution Code and Reason
 Non-Federal Source Code
 Partner ID (Large, Small or Other Business)
 Date of Update
 Effective Date
 Date of Amendment
 Estimated Completion Date
 Status (Open/Closed)
 NAIC Code (Formerly SIC)
 Maturity of Technology
 Objective
 Approach
 Progress (New, On-going, Extended, Complete)
 Date Last Submitted to DTIC
 State (Where Partner is Located)
 Partner Name

The Technology Transfer Commercialization Act of 2000, requires more fiscal information as shown on the following pages in the language provided by the Office of the Secretary of Defense.

1. Did one or more of your laboratory/center products transferred under a CRADA become available for consumer (public) or commercial use in the reporting fiscal year?
 Yes _____ How many? _____ No _____
2. Did one or more of your industry partnerships under CRADAs produce technologies that will serve to strengthen the capabilities of the laboratory? Yes _____ How many _____?
 No _____ (answer by definition is “all of them”)

If the answer is “Yes” to either or both question(s) 1. and/or 2., please submit a brief summary, for as many technologies as you may wish to highlight, on the Technology Transfer Success Story form provided.

(Example for 1. The lab has a technology for processing materials using a variable wavelength laser. Under a CRADA, the partner applies the technology to one of its materials and is able to change certain performance capabilities, which allow its material to be used in a particular commercial application.)

(Example for 2. Under a CRADA, a lab modeling and simulation program was enhanced to solve a partner’s specific technical problem. The enhancement allowed the lab to apply this enhancement to its mission related work, with dramatically improved modeling and simulation results.)

Intellectual Property (IP) Management:

In the reporting FY, how many new inventions were disclosed? How many patent applications were filed on inventions? How many patents were issued for inventions?

<i># of New Inventions Disclosed</i>	<i># of Applications for Patents Filed in FY __</i>	<i># of Patents Issued for Inventions in FY__</i>

How many active, commercial, invention licenses were in force at the end of the reporting FY?
How many new commercial invention licenses were executed?

# of Active Invention Licenses	# of New Invention Licenses in FY__

# of Active Licenses for "Other IP"	# of Active Licenses for Non-Patented IP	# of Active Licenses for Authored Work	# of Active Licenses for Protected CRADA Information

(Non-patented IP would include licensed or bailed biological materials and "Reference Documents."
Authored works would include licensed software, engineering drawings, or reference data.
Commercially valuable information would include special "know-how" used at the lab and applied to solve a specific problem relating to a partner's product. Because the process, when applied to the product gives the partner's product a competitive advantage, the partner may deem such information "commercially valuable." Under the terms of a license, the lab agrees to not disclose this information for up to five years.)

What was the amount of license income your organization received in the reporting fiscal year?



What was the amount of income from invention licenses? What was the amount of income from "other IP" licenses? How many licenses are earning "running royalties?" ("Running Royalties" are annual payments made to the organization by the licensee that are based upon the sale or use of a licensed intellectual property.) What was the amount of income from "running royalties?"

Total Income from License (Millions of \$)	Income from Invention Licenses (Millions of \$)	Income from "Other IP" License (Millions of \$)	# of Licenses Earning Running Royalties	Total Income from "Running Royalties" (Millions of \$)

3. Did one or more of your organization's licensed products become available for consumer (public) or commercial use in the reporting fiscal year?
Yes _____ How many? _____ No _____

4. Did one or more of your licensees produce a licensed product or process that will strengthen the capabilities of your organization?
Yes _____ How many? _____ No _____

If the answer is "Yes" to either or both question(s) 3. and/or 4., please submit a brief summary.

5. Does your organization formally review all documents to be released to the public for the unintended disclosure of proprietary, export controlled or invention related information?
Yes _____ No _____

6. If Yes, how many were reviewed in the reporting fiscal year? _____

7. Are titles and/or abstracts of the documents retained in electronic media for reference?
Yes _____ No _____

Investment Level

Investment level information is used by the Air Force Technology Transfer Management Team to calculate part of the transfer performance measure. This information includes data on the Air Force investment, the outside partner investment, and the transfer focal point overhead costs. The local transfer focal point is responsible for reporting the investment data for each formal transfer once each year in the focal points' organization technology transfer business

plans which are due annually to AFRL/XPTT on November 1st.

The investment level for each partner is reported separately. These will be estimates of what each partner is bringing to the table. However, each transfer focal point should take care not to inflate these values. Justification and reasoning for calculating these values should be kept locally by the transfer focal point. Only the total for each partner is reported. The Air Force Technology Transfer Management Team does not need the breakdown of how the focal point derived the total.

Guidelines for Setting Cost of Services

Cost of services directly supports the calculation of Air Force investment.

When calculating the level of investment for either the Air Force organization or the outside partner, the following elements should be included in the cost calculation:

- Cost of direct person-hours to be expended (if an exact dollar figure is not available, estimate the labor rate and multiply by the number of person-hours being committed to the transfer agreement)
- Cost of anticipated travel (includes per diem, etc.)
- Cost of facilities
- Equipment maintenance
- Direct materials
- Direct services

These values should be the burdened values (if known) of these factors. If compensation comes from the other partner for any of the above items, include it in their estimated investment.

Focal point overhead costs need to be reported on a fiscal year basis. Overhead includes those costs that are not directly accounted for in the specific transfer agreements but are expended by the center or laboratory transfer focal point staff. Staff includes the direct ORTA staff plus support from the judge advocate (JA), contracting (PK), financial (FM) and public affairs (PA), etc., staffs at each location.

When calculating the level of overhead investment, the following elements should be included in the cost calculation:

- Direct person-hours to be expended (if an exact dollar figure is not available, estimate the labor rate and multiply by the number of person-hours being committed to supporting technology transfer activities)
- Travel
- Marketing (brochures, exhibits, advertisements)
- Training
- Office equipment (capital and maintenance) and supplies
- Contract services in support of any transfer activity
- Government seed money to cultivate transfer efforts
- Local transfer awards program

The Format is in Dollars

All of these overhead cost figures should be in direct support of the transfer mission. Funds may come from transfer revenue or other overhead account sources, as long as these costs are not being reimbursed.

The investment-level values for each partner should be reported to the Air Force Technology Transfer Management Team at the time of the signing and approval of the formal transfer agreement. The overhead should be reported once per year in the annual business plan.

The Equation Using the Data Equals

$$\begin{array}{ccccc} \textit{Air Force} & & \textit{Air Force} & & \textit{Outside Partner} \\ \textit{Investment} & = & \textit{Investment per} & + & \textit{Investment per} \\ \textit{Level} & & \textit{Transfer Agreement} & & \textit{Transfer Agreement} \end{array}$$

The data are calculated for each laboratory directorate and center and then added together by type of location (laboratory directorate, product, test, or logistics center) and then added together into the Air Force value.

